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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/005,883	12/03/2001	Roger W. Whatmore	THOR/0008	7985

7590 12/28/2004  
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EXAMINER
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TRINH, HOA B

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 12/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/005,883

Applicant(s)

WHATMORE, ROGER W.

Examiner

Vikki H. Trinh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 October 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5, 8-11, 13, 16-22 and 27-35 is/are rejected.
- 7) ☒ Claim(s) 4, 6, 7, 12, 14, 15 and 23-26 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 1204.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### DETAILED ACTION

Claims 1-35 remain pending in the application and are shown above. Claims 1-3, 5, 8-11, 13, 16-22, and 27-35 stand rejected and claims 4, 6, 7, 12, 14, 15, 23 - 26 are indicated to be allowable by the Examiner.

#### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 1-3, 5, 8, 9-11, 13, 16, 17-22, and 27-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Solomon (5,030,828) in view of Thomas et al. (4,369,458).

Solomon discloses a method of fabricating a radiation detector array comprising the steps of: a) providing on one face of a layer of material, an array of detector elements 28 (col. 6, lines

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8-14), and b) forming an array of cavities 13, 36 in the layer of material such that each detector is positioned at the base of a cavity (fig. 1).

However, Solomon does not teach the step of c) bonding the array of cavities and detectors to a silicon integrated circuit including a corresponding array of amplifiers and multiplex switches.

Thomas et al. '458 teaches a method of making a radiation array having the steps of bonding (col. 2, lines 33-50) the array cavities 30, 32, 34 and detectors 28, 26, 38, 40, 58 to a silicon IC including the array of amplifiers and multiplex switches (figs. 2-3).

Therefore, as to claims 1, 9, it would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Solomon with the bonding step, as taught by Thomas et al., so as to provide parallel interconnections with the bonding of the arrays. (Thomas et al., Col. 2, lines 4-14). As to claim 17, the method above produces an array as claimed.

As to claims 2-3, 10-11, the layer of material is a silicon wafer 10 and the cavities 13 are formed by ion etching the wafer. Fig. 1 and Col. 6, lines 50-55.

As to claims 5, 13, 29, 35, the method and device includes partially coating the cavities with metal. The examiner interprets that the metal coating with conical shape of the cavity is the lens for performing the same function, i.e. for providing the angular collection efficiency, as stated in claim 30. Col. 6, lines 10-15.

As to claims 8, 16, 31-32, the method further including the step of wholly or partially filling the cavities with dielectric material of refractive index higher 18 (col. 6, lines 12-15) than air.

As to claim 18, the elements are infrared detector elements. See Thomas et al., Col. 1, line 11.

As to claims 19-22, the cavities have a gradually reducing cross sectional area such as a conical or parabolic shape. See Solomon, figs. 2-3.

As to claims 27-28, the bonding step include the conductive bumps 106, 108, 112 made of solder (Thomas et al., fig. 4) for providing a support.

As to claims 33-35, the detector elements 90 have a thin film absorber such as a silicon dioxide coated with a thin layer of metal for preventing any diffusion effect. Thomas et al., Col. 9, lines 24-28.

#### ***Allowable Subject Matter***

Claims 4, 6-7, 12, 14-15, 23-26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:  
The prior art of record does not disclose or fairly teach either in singly or in combination a method and device for a radiation detector array comprising a profiled polymer mask used to define the array of cavities, a metal coating is sputtered onto the cavities, wherein the metal is evaporated onto the cavities, and other elements and steps in the claims.

#### ***Response to Arguments***

5. Applicant's arguments filed 10/12/04 have been fully considered but they are not persuasive.

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6. In the remarks, applicant argues the rejection under 35 U.S.C. section 103 of Claims 1-3, 5, 8-11, 13, 16-22, and 27-34. In particular, applicant states that Thomas does not cure Solomon's deficiencies because the array of cavities of Solomon with the bonding step of Thomas would not provide an array of detectors bonded to a silicon integrated circuit as referenced in independent claims 1, 9 and 17. Nonetheless, applicant continues with the argument by amending claims 1, 9, and 17 to "clarify the aspects of the invention". The examiner notes that in the previous Office Action the examiner did not make any rejection under 35 U.S.C. section 112, second paragraph, to suggest applicant to clarify the aspects of the present invention. Rather, applicant attempts to amend the claims so as to overcome the rejection under 35 U.S.C. section 103 in the previous Office Action. However, as stated, Solomon (U.S. Patent 5,030,828) in view of Thomas, et al. (U.S. Patent 4,369,458) disclose a method of fabricating a radiation detector array comprising the steps of: a) providing on one face of a layer of material, an array of detector elements 28 (col. 6, lines 8-14), and b) forming an array of cavities 13, 36 in the layer of material such that each detector is positioned at "the base only of a cavity" (FIG. 1). Solomon's deficiency is cured by Thomas, who teaches a method of making a radiation array having the steps of bonding (col. 2, lines 33-50) the array cavities 30, 32, 34 and detectors 28, 26, 38, 40, 58 to a silicon IC including the array of amplifiers and multiplex switches (FIGs. 2, 3), as stated in claim 1. Moreover, Solomon discloses an array of cavities, wherein the entire wall and floor of each cavity 13 has a body of detector material formed as a layer thereon (col. 4, lines 43-45). The cavity comprises a floor which tends to either "reflect incident photons deeper into the cavity and onto another section of the floor or which tends to reflect incident photons onto the walls of the cavity". Accordingly, Solomon and Thomas teach on one face of the material, an

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array of detector elements, each including a material which absorbs the radiation, such that one element is positioned at the base only of each cavity, and bonding the array of cavities and detectors to a silicon integrated circuit including a corresponding array of amplifiers and multiplex switches, as recited in independent claim 9. Furthermore, Solomon and Thomas teach “a radiation detector array comprising an array of radiation collector cavities formed in a layer of material, the cavities having walls which reflect the radiation, and an array of detector elements on one face of the layer of material arranged with an element at the base only of each cavity, the elements including a material which absorbs the radiation, wherein the array of cavities and detectors is bonded to a silicon integrated circuit including a corresponding array of amplifiers and multiplex switches”, as recited in independent claim 17.

Therefore, for the foregoing reasons, claims 1, 9 and 17 and all of their dependent claims 2-8, 10-16 and 18-35 stand rejected.

### Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Vikki Trinh whose telephone number is (571) 272-1719. The Examiner can normally be reached from Monday-Friday, 9:00 AM - 5:30 PM Eastern Time. If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, Mr. Wael Fahmy, can be reached at (571) 272-1705. The office fax number is 703-872-9306.

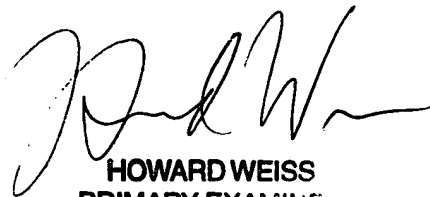
Any request for information regarding to the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Also, status information for published applications may be obtained from either Private PAIR or Public Pair. In addition, status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. If you have questions pertaining to the Private PAIR system, please contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).

Lastly, paper copies of cited U.S. patents and U.S. patent application publications will cease to be mailed to applicants with Office actions as of June 2004. Paper copies of foreign patents and non-patent literature will continue to be included with office actions. These cited U.S. patents and patent application publications are available for download via the Office's PAIR. As an alternate source, all U.S. patents and patent application publications are available on the USPTO web site ([www.uspto.gov](http://www.uspto.gov)), from the Office of Public Records and from commercial sources. Applicants are referred to the Electronic Business Center (EBC) at <http://www.uspto.gov/ebc/index.html> or 1-866-217-9197 for information on this policy. Requests

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to restart a period for response due to a missing U.S. patent or patent application publications will not be granted.

Vikki Trinh,  
Patent Examiner  
AU 2814



**HOWARD WEISS**  
**PRIMARY EXAMINER**